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coast of New England (1873, pt. I, p. 379) he mentions a Phryganid larva, probably a Molanna, found in Menemsha bay, Mass., in connection with *Chironomus oceanicus* Pack.——The report of the Director of the (Illinois) State Laboratory of Natural History has just been received from Professor S. A. Forbes and exhibits a comprehensive plan of work, covering general natural history. The investigations into the food of fishes and of birds, and into the nature of parasitic plants and animals that are being prosecuted in this laboratory, are of the most satisfactory and thorough character, and give the laboratory preëminence in these fields. In the entomological work Professor Forbes has been ably assisted by Mr. F. M. Webster and Mr. W. H. Garman.——In his first annual report of the Ohio Agricultural Experiment Station, Director Wm. R. Lazenby makes a satisfactory showing and devotes considerable space to economic entomology. In almost every case the experience at the station with remedies for the more destructive insects accords with and corroborates that which we have placed on record.——In the Proceedings of the American Philosophical Society (vol. xx, June to December, 1882), recently issued, there are two important entomological papers. The one is Dr. S. W. Williston's "Contributions to a Monograph of the North American Syrphidæ." As the genera and species of this family occurring in the United States have never before been tabulated, this careful paper is indispensable to the student of our Diptera. The second paper is the "Revision of the Dermestidæ of the U. S.," by Dr. H. F. Jayne, accompanied by four plates, drawn and engraved by Dr. G. H. Horn. As Dr. LeConte's synopsis of that family, written nearly thirty years ago, has become incomplete by virtue of subsequent discoveries, Dr. Jayne's paper is a most welcome contribution.——Mr. Franklin Hill contributes in the *American Journal of Science* (xxv, p. 137–138) a short illustrated paper on the antenna of Meloe, referring to the well-known distortion of that organ in the male sex and explaining its use during copulation.

ZOÖLOGY.

SUDDEN DESTRUCTION OF MARINE ANIMALS.—Professor T. Rupert Jones accounts for the manner in which a large number of marine animals have in past ages suddenly perished in their own element and been entombed: 1. (fishes) By either unusual or periodical influx of fresh water from the land; 2. By volcanic agency; 3. By earthquake waves; 4. By storms; 5. (fishes) By suffocation, when massed together in frightened shoals, or when burrowing in sand and mud and accidentally buried by other sands and mud; 6. (fishes) By being driven ashore by fishes of prey; 7. (fishes and mollusks) By too much and too little heat in shallow water; 8. (fishes and mollusks) By frost; 9. (fishes) Diseases and parasites; 10. (fishes and mollusks) Miscellaneous causes: disturbance of equilibrium of living and dead organisms, ferruginous springs, poisons, lightning, &c.; 11. Marine life surviving in fresh-water lakes.—*Journal of the Royal Microscopical Society.*

DESICCATION OF ROTIFERS.—The Rev. Lord S. G. Osborne, referring to a previous letter of Mr. Jabez Hogg as to the Rotifers and Amœboe revived from "earth" taken from Durwaston, says[1] that it was simply the dust of the garden which happened to deposit itself in certain cup-like receptacles, made artificially of a substance which coated itself with an oxide, giving to the dust when wet a rusty appearance. After having been in a drawer for more than three years no symptom could be detected of a decrease in the number or activity of the stock. He adds: "It is to me inexplicable that although I have collected very many specimens of the Rotifer (*R. vulgaris*) from plants taken from ponds, I never could acclimatize these in my tanks so that they would bear the drying process so successfully as when procured after my own fashion."—*Journal of the Royal Microscopical Society.*

THE CAUSE OF "ROT" IN SHEEP.—The transformation of the parasite worm, or liver-fluke, which causes "rot" in sheep, after many years of effort on the part of different naturalists, have, at length been discovered, nearly simultaneously, in England and Germany. Mr. A. P. Thomas writes to *Nature* that the winter of 1879–1880 was marked by a widely-spread outbreak of the liver-rot among sheep. The losses during that winter were estimated at three million sheep, of about one-tenth of the total number in Great Britain, and during the next winter the losses were equally severe. It had for years been known that the cause of the disease was the occurrence in the liver of large numbers of the liver-fluke (*Fasciola hepatica*), and that these parasites invaded sheep, or sometimes other animals, allowed to feed in wet pastures and especially on flooded ground; but, notwithstanding that the subject had been repeatedly investigated by numerous zoölogists, including Professor Leuckart, of Leipzig, so well known for his researches on animal parasites, the manner in which the disease was incurred remained a complete mystery, It was known, indeed, that the animals most nearly allied to the liver-fluke, the digenetic Trematodes, presented an alternation of generations and that they possessed larval forms infesting various species of mollusks. These nurse-forms, as they are called, produce internally larvæ, usually tailed, known as Cercariæ, which leave the nurse and encyst themselves in some other mollusk or in aquatic insect larvæ, etc., and remain there quiescent, only reaching maturity if swallowed, together with the animal harboring them, by some suitable vertebrate host. Such is a typical instance of the development of a Trematode with alternation of generations; but there is a good deal of variety in the life histories of the different species. It was supposed that the liver-fluke had a somewhat similar life history; but all attempts to discover what mollusk served as intermediate host had been fruitless.

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[1] *Times*, 4th October, 1882.

The Royal Agricultural Society of England having offered a grant for the investigation of the natural history of this destructive parasite, Mr. Thomas undertook the research, and in April, 1881, after working through the summer and autumn of 1880, he suggested that a snail (*Limnæus truncatulus*) was really the intermediary host. For over a clearly circumscribed area of infection, situated on the side of a hill far above the reach of floods he found that almost the only species of water-snail occurring in the ground was *Limnæus truncatulus*, found in a boggy spot. This contained an interesting form of Cercaria, produced in a cylindrical *redia* or nurse-form provided with a digestive tract.

The Cercaria had a tail, which, when fully extended, was more than twice the length of the body. It was exceedingly active, but soon came to rest, showing a strong tendency to encyst itself in surrounding objects. Mr. Thomas had a few months previously seen a sheep, which he had the best possible reason for knowing to be infected with flukes, wandering over the boggy spot from which the snail containing the Cercaria came, and the presence of so highly-developed an organ for the production of the substance of the cyst in a Cercaria which encysted on any plants at hand, seemed to indicate that here was the Cercaria of the liver-fluke, and it has since proved that such was the case. Moreover, he had collected evidence from independent sources, which rendered it probable that the parasite was taken up by the sheep while grazing from the damp roots of grass, most likely in the encysted condition. During the summer of 1881 no snails were to be found, and last winter the sheep near Oxford were free from the liver-rot. In 1882, however, there were floods on the Isis in July, and *Limnæus truncatulus* was brought down by the water in vast quantities, probably from marshy ground far up the river. On discovering these snails, he started infection experiments with them, and was at once successful. The adult fluke in the liver of the sheep or other mammalian host produces vast quantities of eggs. So prolific is it that he has estimated the number produced by each fluke to be, at least, several hundred thousand. The eggs pass with the bile into the intestines, and are distributed over the fields, with the manure. If the eggs fall on wet ground or are washed into a ditch, development continues, and after a time, the length of which depends upon the temperature, embryos are hatched out of the eggs.

For the purpose of his infection experiments Mr. Thomas obtained eggs from the livers of affected sheep, and kept them in water until the embryos were hatched, and then transferred them to vessels containing the snails to be experimented upon. After the embryos enter the snail, they best develop in the pulmonary chamber, as well as in the body cavity. Here the embryo undergoes a metamorphosis, becoming elliptical in shape. It becomes a mere blood-sac, in which the next generation is produced. The germs increase in size and each becomes a *redia*, as the nurse-form, provided with pharynx and intestine, is called. When the *redia* is ready to come forth, it breaks through the walls of the brood-sac (sporocyst), increases in size, finally becoming one-twentieth of an inch in length. Within them develop from minute cells germs of which form Cercariæ, each with a sucker at the anterior end and another in the middle beneath. They have, also, the anterior part of the body covered with exceedingly minute spines, and this form is believed by Thomas to become the fluke-worm. Similar forms in the same species of snails were at about the same time reared independently by Professor Leuckart, in Germany, whose statements confirm those of Mr. Thomas in the *Zoölogischer Anzeiger*. Mr. Thomas' final paper appears in the *Quarterly Journal of Microscopical Science* for January, and is illustrated with several plates.

CHROMATOPHORES IN CRUSTACEANS.—Dr. Max Weber has described the structure of *Haplophthalmus* and *Trichoniscus*, genera belonging to the exceptional Isopod sub-family of Trichoniscidæ. The structure of Trichoniscus, save in regard to externals, had not before been investigated. The copious details which such an essay contains must necessarily be studied in the original. Points of general interest, affecting other isopods, are duly indicated.

Dr. Weber makes a digression on the subject of chromatophores. Leydig first showed that in the same situations as chromatophores are found cells without pigment, but otherwise similar, the whole forming one common system. Also animals of constant tint possess non-contractile cells, presumably homologous with chromatophores. These are unquestionably distributed to the chromatophores. By means of gold chloride Dr. Weber has proved this connection in the case of a common isopod (a young Philoscia). Anger, fear, love and other emotions undoubtedly cause animals with chromatophores to change color; yet it is usually assumed that the play of the chromatophores serves to hide their possessor, and perhaps in some cases for protection. But Leydig saw tree-frogs amid their natural surroundings, change spontaneously their beautiful green for a dirty gray tint, just as they are known to do in captivity, especially during murky weather. The inference follows that a depressed temperature here acts on the chromatophores, particularly when we consider that these organs are an appanage of pœcilothermous animals. We learn from v. Platen, Moleschott and Tubini, that light acting directly on the skin (apart from what is termed the chromatic function, or the indirect influence of light through the eyes) enhances the metamorphosis of tissue. Dr. Weber concludes that one use at least of the chromatophores is to diminish the transparency of the skin and thus to lower the action of even moderate light when it begins to affect injuriously the organism.

THE METAMORPHOSIS OF PENEUS.—Dr. W. K. Brooks, in his account of the metamorphosis of Peneus (Johns Hopkins University Circulars, Nov., 1882), noticed in the January number of the NATURALIST (p. 90), says:

"Those familiar with the literature of the subject will recollect that Fritz Müller kept under observation until it changed into a protozoëa, a nauplius which he captured at the surface of the ocean. He also secured, in the ocean, a very complete series of larvæ, through which he identified his protozoëa with a young Macrouran with the characteristics of the genus Peneus. He did not rear the nauplius from the Peneus egg, nor did he actually observe the transformation into the young Peneus. Certain over-cautious naturalists have therefore refused to accept his conclusions until more conclusive proof should be furnished."

Dr. Brooks then proceeds to state that he has captured the protozoëa of Peneus and reared it in confinement, witnessing every one of the five molts between the youngest protozoëa and the young Peneus. "The whole metamorphosis of Peneus has therefore been actually witnessed and there is no longer any room for criticism."

If Dr. Brooks will read Fritz Müller's two papers on the subject (Arch. Naturgesch., Bd. XXIX., Zeitschr. wissensch. Zoöl., Bd. XXX), he will learn that Müller did *not* keep the nauplius under observation until it changed into a protozoëa, but that he captured the protozoëa in the sea and inferred its relation with the nauplius from its likeness in movements, color and structure. This assumed relation between the protozoëa and the nauplius "certain over-cautious naturalists" wished to see proved either by hatching the nauplius from the egg of Peneus, witnessing the transformation of the nauplius into the protozoëa, or discovering intermediate stages between the nauplius and the protozoëa. Brooks' observations have no bearing on the question whatever. He has proved the connection between the stages older than the nauplius. That the nauplius belongs to the same series, he has not shown. In fact, his youngest protozoëa is an older stage than the youngest protozoëa secured by Müller. He has riveted the links in Müller's chain that were closely joined before, but has not touched the weak spot!

From the complete disappearance of the exopodites from the five pairs of legs and the simplicity of the abdominal appendages in the oldest stage observed, it would appear that Brooks' larva belongs to the genus Sycionia rather than to Peneus.

The larval stages of the Peneidæ seem to be not uncommon in the warmer seas. Besides the published figures of Müller and Claus, I have seen drawings of the developmental stages, from the protozoëa onward, made by Mr. Alexander Agassiz at the Tortugas islands in 1881, and by Mr. J. W. Fewkes, at the Bermudas, in 1882. No observer has re-discovered Müller's nauplius; yet in the light of our knowledge of the development of Mysis, Euphausia and Lucifer, I see no good ground for refusing to accept Müller's reasons for believing his nauplius and zoëa stages to be parts of one life-history.—*Walter Faxon, Cambridge, Mass., March 9, 1883.*

DISCOVERY OF EURYPAUROPUS IN EUROPE.—Dr. R. Latzel, of Vienna, writes us under date of February 23, that last summer he discovered in Austria the genus Eurypauropus of Ryder. It is there represented by two species, the rarer one of which is very similar to *Eurypauropus spinosus* Ryder. He has also detected *Pauropus huxleyi* of Lubbock. We believe this is the first time Pauropus has been detected on the continent.

REPUGNATORIAL PORES IN THE LYSIOPETALIDÆ.—Having received, through the kindness of Dr. Latzel, specimens of *Lysiopetalum carinatum* Brandt, from Dalmatia, which is a very large species, I have been able to examine the repugnatorial pores, which are very distinct, their crateriform openings being situated each between two ridges on the anterior edge of the raised portion of the scute. In *L. illyricum* Latzel, from Austria, they are with difficulty perceived, the area in which they are situated not being discolored with yellow; but they can be detected with a half-inch objective. The two European species mentioned are provided with setæ, while our *L. lactarium* is naked. In the latter species the repugnatorial pores are situated in the middle of the yellow lateral spot, between two carinæ, which are higher and closer together than any of the others. They can be seen with a Tolles triplet.

Reëxamining the cave Lysiopetalid, *Pseudotremia cavernarum* Cope, from Wyandotte cave, and a variety *carterensis* which inhabits the Carter caves, Ky., I cannot with certainty discover their site, as they are nearly, if not quite, obsolete. It is possible that in cave species, where there are apparently no enemies of these Myriopods, their pores become at least externally obsolete.—*A. S. Packard, Jr.*

POISON-APPARATUS OF SCORPIONS.—M. Joyeux-Laffuie finds that the poison organ of the scorpion (*S. occitanus*) is formed by the last abdominal segment, where two small oval orifices serve for the exit of the poison; there are two glands, equal in size, and symmetrically arranged; each occupies a space, covered externally by the chitinous skeleton, and having internally an interior and posterior membrane, formed by striated muscular fibres, which are inserted into the chitinous skeleton. By their contraction the poison is forced outwards. The wall of the gland consists of a delicate layer, formed by cellular tissues and smooth muscular fibres; on its internal surface there are projecting lamellæ, which increase the extent of the secreting surface; below this, is a layer of prismatic cells, which are filled with protoplasm, containing in suspension, and in abundance, fine rounded granulations, which are characteristic of the poison of the scorpion, and hide the nuclei, which only become apparent on the addition of acetic acid; these are the cells which elaborate the poison, and from which it escapes, by the rupture of the cells, into the central cavity of the organ.

Physiologically, this poison is very active, and that in direct relation to the quantity introduced; one drop is soon fatal to a rabbit and still more active on a bird; seven to eight frogs may be killed by one drop, and the hundredth part of one is fatal to an ant of large size. It would appear to affect the nervous system, and has undoubtedly a marked action on striated muscle, suppressing spontaneous and reflex movement.—*Journal of the Royal Microscopical Society.*

THE HABITS OF THE SNAKE BIRD.—The mechanism of the neck in the darters (Plotus) is treated by W. A. Forbes in the Proceedings of the London Zoölogical Society. The darters feed entirely, so far as Mr. Forbes had been able to observe, under water. "Swimming with its wings half expanded, though locomotion is effected entirely by the feet, the bird pursues his prey (small fishes) with a peculiar darting or jerking action of the head and neck, which may be compared to that of a man poising a spear or harpoon before throwing it. Arrived within striking distance, the darter suddenly tranfixes, in fact, bayonets, the fish on the tip of its beak with marvelous dexterity, and then immediately comes to the surface, where the fish is shaken off the beak by jerking of the head and neck (repeated until successful), thrown upward, and swallowed, usually head first." A study of the neck in the recently dead bird leaves little doubt as to the mechanism by which this peculiar impaling of the prey is effected. The eighth cervical vertebra is articulated with the seventh in such a way that the two cannot naturally be got to lie in the same line, but form an angle, open forwards, of about 145°, when the two bones are stretched as far as possible in that direction. After further describing the mechanism, Mr. Forbes thus concludes his paper: "It is obvious that considerable advantage is gained by the action in question, the rapid protrusion of the narrow neck and head over a small space by this mechanism necessitating a less amount of exertion than would a similar movement of the whole bird over the same space, and being equally efficacious in striking the prey. The whole mechanism, it may be observed, exists in a less developed form in the neck of the herons, cormorants, etc.; and it requires but a slight modification of the arrangement of these parts in those birds—none of which, so far as I know, impale their prey like the darters—to bring about the perfect adaptation of these structures to a newly acquired mode of feeding. Mr. Forbes' observations refer to the Indian darter (*Plotus melanogaster*), but will undoubtedly apply to our Anhinga bird.

ZOOLOGICAL NOTES—*Protozoans.*—The *Journal de Micrographie* for February contains illustrated reports of Professor Balbiani's lectures at the College du France on unicellular organisms, also continues the report of his useful course on Sporozoa, finishing his account of the Coccidies. Dr. Pelletan, the editor, publishes an account of the reproduction by division of *Dinobryon stipitatum.*——Some interesting Infusoria are described by A. Gruber in the last number of *Zeitschrift für wissen. Zoologie.*——H. O. Brady describes Keramosphæra, a spherical porcellanous foraminifer analogous to Orbitolites and dredged about twenty-five degrees south of the south-western corner of Australia, by the *Challenger* (*Annals and Mag. Nat. Hist.*).

Sponges.—Mr. H. J. Carter describes several new sponges, and proposes the group of Phlœodictyina for certain species having a laminated and concentric structure. The green color of Spongilla is situated in the little spherical granules of the sponge-cell. ——Mr. Stuart O. Ridley describes four new Primnoans and Gorgonians from the Mauritius.

Cœlenterates.—The arrangement of the family Coralliidæ, to which the red coral of commerce belongs, has been discussed by S. O. Ridley in the Proceedings of the Zoölogical Society of London. These alcyonarian corals are chiefly remarkable for possessing a continuous stony axis, covered by only a thin cortical layer of a softer spiculiferous material, into which the polypes are retractile. Precious coral, probably all derived from the Mediterranean, is used by the Chinese and Japanese as ornaments, a Chinese empress's necklace having been made of alternate pieces of jade and coral.——One of the most interesting results of the studies of MM. A. Kowalevsky and A. F. Marion on the development of the Alcyonaria, was the great difference observed in the order of the appearance of various parts in Sympodium. In some larvæ of delayed fixation the dissepiments were sketched out while the vermiform stage persisted, and the ectoderm had developed mesenteric folds and a section almost identical with that of an Actinia, while yet no sclerites was forming. In the same laying were normal larvæ that were quickly transformed.

Worms.—Dr. J. Barrois publishes (*Ann. and Mag. Nat. Hist.*) an attempt at a general theory of the embryogeny of the Bryozoa (Polyzoa), founded upon the study of their metamorphoses. This observer states that the relations between the larva and the adult have not before been fully made out. In the Entoprocta there is a very complete passage, though in a complex manner, of the organs of the larva into those of the adult. In the Ectoprocta the larvæ are more different from the adult form. The development of the mantle in the larvæ and the reduction of the internal organs which accompanies it, are a series of purely *adaptive* characters. Dr. Barrois believes that the entoproct larva represents the ancestral type of the entire group, remarks that such a larva is constructed on the same plan as a rotifer, and conceives of the original formation of a Bryozoan *as resulting from a simple change of life* in an organism resembling a Rotifer. The Probryozoa, in his hypothesis were free-swimming organisms possibly analogous to the Rotifera.——Professor M'Intosh describes Cephalodiscus, a singular polyzoan dredged by the *Challenger* in the Straits of Magellan, and allied to Rhabdopleura (*Ann. and Mag. Nat. Hist*).——The Rev. T. Hincks, in his sixteenth " Contribution towards a General History of the Marine Polyzoa" (*Ann. and Mag. Nat. Hist.*) describes six new species, and in his notice of the Polyzoa of the Queen Charlotte islands give preliminary descriptions of thirty-four species.——Mr. W. A. Haswell (*Ann. and Mag. Nat. Hist.*) states that the elytra of the aphroditarean annelids are connected with the functions of (1) protection; (2), production of phosphorescent light; (3), sensation, and (4), incubation. In *Iphione* the scales are dense, causing the animal to resemble a chiton. As they are provided with abundant nerves, they are probably the seat of some special sense. The ova are carried by ciliary action to the under surface of the scales, where they adhere till the embryos are well advanced. Impregnation probably takes place while the eggs are in this position.——M. A. Giard (*Comptes Rendus*) describes an annelid with synthetic characters uniting the Lycoridea (to which it is closest) with the Hesionea and Polynoë, on the one hand, and with the Syllidea on the other. It inhabits a sort of tube formed by the raised lateral margins of the thoracic region, upon the dorsal aspect of a Balanoglossus (*B. robinii*), which at the Iles Glenans attains a meter or more in length. The proboscis is entirely unarmed, which is remarkable in a Lycoridian.

Mollusks.—It appears that in Ceylon *Helix hæmastoma* is protected from observation by being covered with a growth of alga, which likewise grows on the trunks of the palms it frequents. *Helix superba* also has a similarly green protective coating, rendering it less visible to passing birds.——An important illustrated article on the vascular and water-receiving system of the Unionidæ and Mytilus, by Dr. H. Griesbach, appears in the *Zeitschrift für wis. Zoologie* of Feb. 20, 1883.

Crustaceans.—Professor F. A. Forel, *Ann. and Mag. Nat. Hist.*, enumerates the Entomostraca that constitute the pelagic fauna of fresh-water lakes, a fauna that in its general features is the same from Scandinavia to Italy and the Caucasus, and from the plains to the Alps. A complete list of the species inhabiting a lake cannot be made at any one season, as the Cladocera periodically disappear and occur at the bottom in the state of resting-eggs. As these pelagic creatures can never rest on a solid body, they have highly developed swimming organs and a light specific gravity, yet they are sluggish, and escape destruction rather by their perfect transparency than by their motions. Some feed on Algæ, but most on animal food. During the night they swim upon the surface, but in the day descend into the depths. All have a strongly pigmented black, brown, or red eye. Professor Forel believes that the regular wind which at night blows from the land to the water has been the cause which has kept a certain portion of the entomostracous fauna of the lakes to the pelagic area until it has become modified to suit its surroundings. As the creatures sink during the day, they escape the breeze that then blows towards the land.

Vertebrates.—At the close of a valuable paper in the Proceedings of the Zoölogical Society of London, on the colors of feathers, Dr. H. Gadow sums up his conclusions as follows: We have to distinguish between several categories of colors in feathers. 1. *Objective chemical colors*, directly produced by pigment. To these belong black, brown, red, orange and yellow. 2. *Objective structural colors.* The feathers may contain no pigment at all, and the color be produced solely by special structural arrangement of the feather-substance, for instance, white, and frequently yellow; the latter, if the surface is composed of very fine and narrow longitudinal ridges. Or the feather contains a yellow to brownish-black pigment, and the color actually observed, as *green*, *blue* and *violet*, is produced by a specially produced and particularly constructed transparent layer between the pigment and the surface of non-changing colors; *blue* and *violet* are always structurally objective. *Green* seems to be only in a few cases the result of yellow pigment combined with blue surface-structure. In most cases it seems to be not a mixture of two colors, but due to yellow-pigment light being broken into green. A green pigment seems to be very exceptional. 3. *Colors which change and which entirely depend on the position of the light and eye.* They are produced by a transparent sheath, which acts like a prism. Any changing color represented in the solar spectrum may be thus produced in feathers.——Professor W. Peters, in the Proceedings of the Royal Prussian Academy of Science, describes *Agamodon anguliceps*, an Amphisbenoid with teeth which differ from those of other Amphisbænidæ in this respect; in other species the teeth are inserted on the inner side of the jaw, so that on turning back the gums their entire length can be seen; while in Agumodon the teeth, as in Agamidæ and chameleons, grow from the border of the jaw, so that only their projecting portion can be seen. The examples were brought from Barava, on the northern part of the east coast of Africa.——In the same Proceedings Professor Peters describes *Opisthoplus degener*, a new genus and species of snake, with the maxillary edentulous, except at its posterior extremity, where it bears a very long sulcated tooth. The same naturalist, in conjunction with G. Doria, describes *Zoötoca atlantica* from the Canary isles.——Dr. Bean notices in the Proceedings of the United States National Museum a collection of birds made by him in the summer of 1880 in Alaska and Siberia.——L. Stejneger publishes in the same Proceedings outlines of a monograph of the swans, and Mr. L. M. Turner describes some variations in *Lagopus mutus* and its allies from the Arctic regions, especially the western coast of Arctic America.

PHYSIOLOGY.[1]

PHYSIOLOGICAL AUTOMATICITY.—Automatic and spontaneous movement is one of the powers of undifferentiated protoplasm, but it has been generally supposed that among the higher classes of animals all automatic and spontaneous actions are brought about by impulses proceeding from certain nerve cells. Thus the contractions of the heart, which still proceed with a definite rhythm after the organ is removed from the body, are supposed to be excited by rhythmic discharges from the nerve cells, which are contained within the cardiac walls. Dr. Gaskell has lately shown, however, that when a slender strip of muscle, perfectly ganglion free, is cut from the apex of a tortoise's heart and hung up in a moist chamber, after the lapse of some four hours the strip commences to contract rhythmically and may continue thus automatically active for some twenty to thirty hours. The initial period of quiescence which follows the suspension may be shortened about one-half if the strip of muscle be stimulated at intervals by a very feeble electrical current. "Every part of the muscular tissue of the tortoise heart possesses the property of spontaneous rhythmical contraction, and the difference in function between the muscular tissue of one part and that of another depends upon the extent to which that property has become on the one hand specially developed or on the other hand rudimentary, owing to the greater development of some other property, such as rapidity of contraction, which was more advantageous for the efficiency of the heart as a whole. In the muscular tissue of the frog's ventricle this rhythmical property seems to be still more rudimentary than in the tortoise."—*Proc. Cambridge Phil. Soc. Vol. iv, pt. 5.*

THE PRODUCTION OF THE SECOND HEART SOUND.—"In the twenty-third volume of Pflüger's Archiv, Professor S. Talma describes experiments which show that the sound produced by the sudden tension of a membrane, loosely stretched across the lower end of a vertical tube filled with water, varies in pitch inversely

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[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.